surface would seem best adapted for the exhalation of this gaseous poison; so that it would sometimes perform the part of an absorbent surface, as when the sulphuretted hydrogen was contained in the air, or of an exhalant, when this substance existed in the blood. This example, which is by no means an isolated one in the economy, would seem to prove that the mucous surfaces, often indifferent in themselves, have no special action in relation to a substance, beyond that which is determined by the conditions under which such substance is presented to them.

M. Bernard performed numerous experiments in order to show that the elimination really takes place by the lungs. It was found that after throwing in the gaseous sulphuretted hydrogen, or a saturated solution of it, into the jugular, paper soaked in acetate of lead held at the nostrils became speedily blackened, and that almost immediately the substance entered the blood. This was repeated at intervals several times, without the animal seeming to suffer inconvenience. No ill effects result, because the substance is eliminated before it can reach the arterial system; while, when it is inspired with the air, the absorbed sulphuret is carried by the pulmonary veins directly into that system. In order to show that pulmonary elimination also takes place when the gas is introduced into the digestive canal, sulphuretted hydrogen was also injected into the stomach and into the rectum. When thrown into the stomach, the paper was found blackened after some seconds; but with respect to the rectum, this effect was not observed until sixty-five seconds after, the elimination not being completed under five minutes.

Owing to the facility of its elimination, M. Bernard suggests that sulphuretted hydrogen might possibly serve as a measure of the rapidity of certain physiological actions, and especially of the phenomena of absorption and circulation. Two experiments are related in illustration: three cubic centimetres of saturated solution of sulphuretted hydrogen were thrown into the jugular vein, and the first spot appeared on the paper at the end of three seconds. The same quantity was thrown into the femoral vein of the same dog, and the earliest manifestation took place only after six or seven seconds. When the quantity injected did not exceed that mentioned above, two or three expirations, and sometimes a single one, sufficed for the complete elimination of the sulphuretted hydrogen.

The question arises whether, when we introduce sulphuretted hydrogen either into the natural channels of absorption, or into the veins, the whole of it becomes eliminated by the lungs. Doubtless, by accurate measurement, this could be determined, but the probability is that it is not the case. Independently of other channels of elimination that may exist, it is probable that some of the sulphuretted hydrogen remains in the blood in the state of sulphur. Thus, when small quantities of the sulphuretted hydrogen are injected at a point as distant as possible from the lungs, no pulmonary elimination takes place, probably because there has been time for the whole to become modified and changed into sulphur before reaching the lungs. It was found that injecting small quantities into the carotid was followed by no elimination, until the repetition of the operation gave rise to a certain amount of saturation. Another proof that some of the sulphuretted hydrogen is retained in the blood, probably as sulphur, is found in the fact that in blood drawn from the animal, and manifesting no odour of sulphuretted hydrogen, the addition of hydrochloric acid, and the application of heat, lead to the disengagement of this gas.

The experiments made require to be repeated and multiplied, in order that the action of sulphuretted hydrogen on the economy should be completely studied. An important fact has, however, been thus far determined, viz., its great tendency, when circulating in the blood, to become eliminated by the lungs: and it may be asked whether such elimination is any way related to the therapeutical effects attributed to sulphureous medicines in certain affections of the chest.—*Med. Times and Gaz.*, Sept. 5, 1857, from *Archives Gén.*, tom. ix.

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9. *Starch from the Animal Kingdom.*—Dr. PAVY exhibited to the Medical Society of London (Oct. 10, 1857) some of the newly discovered amylaceous material which is obtainable from the healthy liver, and which forms the source

of the animal sugar. In referring to the history of the saccharine secretive function of the liver, Dr. Pavy stated that, upon the announcement of the discovery by Bernard in 1848 that sugar was formed in the animal body, it was referred to a transformative action of the liver on an albuminous constituent of the portal blood. The celebrated experiment of puncturing the floor of the fourth ventricle, and establishing diabetes, rather supported this view; for it was thought that the irritation of the nervous centre stimulated the secretory action of the liver, and led to the production of a superabundance of sugar, which, accumulating in the circulatory system, was pumped off by the kidneys, and thus appeared in the urine. The next step of information removed the direct influence of the nervous system, and showed that the production of sugar could not be regarded as analogous to the process of secretion. In September, 1855, in fact Bernard announced, at the Académie des Sciences, that the formation of sugar continued for as many as twenty-four hours after death in a liver from which the blood had been entirely removed. If, for instance, the liver of a healthy animal be removed immediately after death, and a current of water be injected from the portal vein through its vessels, the whole of the blood is washed out, and the organ is also quickly deprived of the saccharine material it contained. Now, if such a liver be placed on one side and examined in a few hours' time, it will be found to have become strongly impregnated with sugar, the production of this material having continued in the exsanguine tissue of the gland. Upon this fact our knowledge had rested until within the last few months. During the early part of the summer, Dr. Pavy had noticed, whilst conducting his experiments on the *destruction* of sugar (which have led him to new and unexpected results, which he will shortly communicate to the profession), that he could isolate a material from the liver which subsequently underwent transformation into sugar; and he had recorded in his laboratory book the influence of chemical agents, such as acids, alkalies, and alcohol, on this material. He had since learnt, however, on his recent visit to Paris, that Bernard had most satisfactorily made out the nature and relations of this body, which, from the analogy presented in its chemical bearings to starch, he had called an animal amylaceous or starchy material. It had also been called glucogenic material, and this was probably the best term to apply to it at present, because it implied nothing more than we knew the substance in reality to be. The specimen of this glucogenic material which Dr. Pavy exhibited had been procured from the liver of a dog in the following manner: The dog had for some days been submitted to a strictly animal diet, so as to preclude the introduction of any starchy material into its system from the vegetable kingdom. After killing the animal, by the destruction of the medulla oblongata, the liver was removed, and a tube firmly ligatured in the portal vein, for the purpose of passing a current of water through the vessels to wash out the blood, and at the same time remove the sugar. In half an hour's time the water which had passed through the vessels was colourless and destitute of sugar, as was also the tissue of the liver itself. The organ was now cut up into small slices, placed in an evaporating dish, boiled in the liquid which exuded from it, and subsequently strained and pressed to obtain all the liquid that was procurable. The object, in fact, was to make a decoction of the liver, which holds in solution the glucogenic material, and has, thereby, communicated to it an opalescent or a milky appearance. This was then mixed with alcohol (in the proportion of one part of the decoction to about five of the spirit), and immediately a precipitate was produced, which was collected on a filter and dried, and formed the specimen then before the fellows of the Society. The substance before him was of a grayish colour, which resulted from contamination with albuminous matter. It might be made perfectly white by prolonged boiling in a solution of potash, which did not at all affect its properties. It was insoluble in alcohol and strong acetic acid. Its solution in water presented the same milky appearance as the fresh decoction of liver. It gave no reaction with the sugar tests, nor was it susceptible of undergoing fermentation. It was, however, readily convertible into dextrine and sugar by the same agents which produced this change in the starch of the vegetable kingdom. Indeed, boiling with acids and contact with diastase, saliva, pancreatic juice, blood, or any animal matter in a state of change, very readily effected its transformation into glucose, when it gave all the characteristic reactions of this substance. Dr. Pavy further stated, *that by means of chemical agents and the microscope the natural seat of this* material could be shown to be in the interior of the hepatic cells.—*Lancet,* Oct. 17, 1857.

10. *On the Immediate Principles of Human Excrements in the Healthy State.*—Dr. W. MARCET communicated the following paper to the Royal Society:—

In a previous paper, I had the honour of communicating to the Royal Society the results of a first series of investigations on the immediate principles of the feces of man and animals; since then I have continued my researches on human excrements, being most ably seconded by my assistant, Mr. Frederick Dupré, Ph.D.

The new results obtained were the following:—

1. *Margarate of lime, phosphate of lime,* and *margarate of magnesia* were discovered to be immediate principles of human evacuations.
2. I found a new method for obtaining excretine, and its chemical formula has been established.
3. The fact that vegetable food induces the presence of margaric acid in excrements has been confirmed.
4. The existence of a comparatively large quantity of cholesterine in the spleen, which I had mentioned before as probable, has been confirmed.

When human feces are exhausted with boiling alcohol, the fluid being rapidly strained through a cloth, a clear extract is obtained, which, in cooling, yields a deposit; this substance being collected on a filter, is partly soluble in boiling alcohol, and there remains undissolved a residue insoluble in ether and alcohol. The residue in question being boiled with a solution of potash, dissolves almost entirely, and the addition of hydrochloric acid induces the formation of a precipitate in the solution. On examining this precipitate, it was found to consist of a crystallizable substance fusing at 60° Cent.: its structure and other properties were precisely those of *margaric acid.*

The acid filtrate contained *phosphoric acid* and *lime.* From several quantitative analyses, I concluded that there was more lime than is required to combine with the phosphoric acid in the form of the neutral phosphate, the excess of lime being exactly that which was necessary to convert the margaric acid into a neutral margarate of lime, $C_{34}H_{33}+O_3CaO$. Consequently it followed that the three substances existed in the form of *margarate of lime* and *phosphate of lime* as immediate principles of human feces.

The alcoholic filtrate from the deposit being allowed to stand for twenty-four hours, deposited another substance, of a nearly white appearance, and which proved to be *margarate of magnesia.*

The peculiar action of a vegetable diet on human feces was investigated by means of experiments undertaken upon myself, when I observed that an entirely vegetable diet was attended with the formation of a large quantity of margaric acid in the excrements—most probably not in the form of a margarate, but in the free state, inasmuch as it was obtained from the decomposition, with hydrochloric acid, of the precipitate induced by adding milk of lime to the cold and clear alcoholic extract of feces, after the separation of the above-described deposits.

In the month of December, 1855, I had an opportunity of noticing that during a cold night, when the temperature falls below the freezing point, *excretine* crystallizes readily and in large quantity in the clear alcoholic extract of feces; this method I employed as often as possible, to prepare enough excretine for its chemical analysis; but the cold weather not lasting long enough, and this season having been remarkably mild, I was compelled to adopt a modification of the process by milk of lime, described in my former communication.

Having prepared a sufficient quantity of excretine partly by the action of cold, and partly by means of milk of lime, the chemical composition of this substance was now determined. A qualitative analysis showed it to consist of carbon, hydrogen, sulphur, and oxygen (a); there was no water of crystalliza-